THE EFFECT OF CALLOUS-UNEMOTIONAL TRAITS AND PEER INFLUENCE ON RISK-TAKING IN DELINQUENT ADOLESCENTS

A Dissertation

Presented to

The Faculty of the Department of Psychology and Philosophy

Sam Houston State University

In Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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by

Laurel A. Mattos

May, 2019

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APPROVED:

Craig Henderson, PhD
Committee Director

Adam Schmidt, PhD
Committee Member

Hillary Langley, PhD
Committee Member

Jorge Varela, PhD
Committee Member

Abbey Zink, PhD
Dean, College of Humanities and Social Sciences

DEDICATION

This work is dedicated to my parents, for instilling in me value for education and hard work, demonstrating these qualities daily, and supporting my own educational journey in every way possible. This work is also dedicated to Harper, Sadie, and Piper, for all the warm cuddles and cold noses along the way.

I would like to thank my academic advisors, Dr. Craig Henderson and Dr. Adam Schmidt, for all your advice, assistance, and instruction along the way. I would also like to thank my research team, Max Christensen, Lauren Ryan, and Kaisa Marshall, as well as the staff at the Olen Underwood Juvenile Justice Center for helping this study get off the ground.

Finally, I would like to acknowledge the support of the American Academy of Forensic Psychology (AAFP) Dissertation Grant Committee.

ABSTRACT

Mattos, Laurel A., *The effect of callous-unemotional traits and peer influence on risk-taking in delinquent adolescents*. Doctor of Philosophy (Clinical Psychology), May, 2019, Sam Houston State University, Huntsville, Texas.

Callous-unemotional (CU) traits designate a unique subset of youth with externalizing psychopathology who commit more than their fair share of delinquent acts and tend to engage in a number of risky behaviors (such as probation violations, sexual offenses, and substance use). However, risky decisions appear to be implied in this behavior, and a greater understanding of the explicit decision-making processes of these youth is needed. One factor that may influence decision-making is the presence of peers, as most adolescents tend to make riskier decisions with their peers than when they are alone.

The current study examined the role of CU traits and peer influence on risk-taking in a sample of 42 males (M = 15.2, 40% Caucasian, 24% Hispanic, 17% African American, 19% Multiracial) who were detained in the juvenile-justice system at the time of data collection. Participants completed three naturalistic risk-taking tasks (the Balloon Analogue Risk Task, the Iowa Gambling Task, and the Angling Risk Task) either alone or in the presence of two peers.

To examine our hypotheses, levels of CU traits were regressed on the three behavioral tasks using multiple linear regression with Bayes estimation. Overall, CU traits were not significantly associated with outcomes on the any of the computerized risk tasks. Additionally, no significant differences in risk-taking emerged between individuals completing the tasks solo versus with peers, contrary to expected results. Our results suggest that youth with high levels of CU traits are not indiscriminately risky. They may

engage in less general risk-taking and less diverse types of risk, and further research on what drives their risky decisions is needed. It is possible other factors of psychopathy are more directly related to general risk-taking than affective, CU traits.

KEY WORDS: Callous-unemotional, Risk-taking, Peer influence, Psychopathy

ACKNOWLEDGMENTS

This study is based on a Doctoral dissertation conducted by L.A.M. at Sam Houston State University. The authors have declared that they have no competing or potential conflicts of interests. The authors would like to acknowledge the dedicated assistance of the staff at the Olen Underwood Juvenile Justice Center and all the individuals that participated in this study.

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CHAPTER I

Introduction

Over 1 million adolescents are arrested and involved in the juvenile justice system each year (Office of Juvenile Justice and Delinquency Prevention, 2015). This number may underestimate offenses, as fewer than half of violent crimes by juveniles are reported to law enforcement (Snyder & Sickmund, 2006). While juvenile crime has decreased steadily over the last decade, adolescent delinquent behavior still represents a significant cost to society. Youth with behavior problems have the highest rates of mental health service utilization, though more than half of adolescents with severe psychopathology may never receive treatment (Merikangas et al., 2011). Adolescent conduct problems are increasingly viewed as a public health problem, and there is a growing movement to introduce more proactive and preventative measures to reduce delinquent behavior (Skeem, Scott, & Mulvey, 2014). One especially "high-risk" group of adolescents who have been a target of recent research are those with significant callous-unemotional (CU) traits.

Callous-Unemotional Traits

CU traits include affective and interpersonal features, such as a lack of empathy, a shallow or blunted affect in response to emotional events, and a callous use of others for personal gain. There is overwhelming evidence that children with high levels of CU traits represent a unique subset of antisocial youth. In fact, a specifier has been added to the DSM-5 to designate youth with conduct disorder who show high levels of CU traits (i.e., "with limited prosocial emotions," including: lack of remorse or guilt; callous lack of empathy; unconcern about performance at school, work, or in other important activities;

and shallow or deficient affect) (American Psychiatric Association, 2013). Studies suggest that CU traits can be reliably measured in young children, even as early as three years of age, and are relatively stable through development (Dadds, Fraser, Frost, & Hawes, 2005; Frick, Kimonis, Dandreaux, & Farell, 2003; Willoughby, Mills-Koonce, Gottfredson, & Wagner, 2014; Willoughby, Waschbusch, Moore, & Propper, 2011). CU traits are similar to the construct of psychopathy in adults (especially interpersonal and affective Factor 1 as measured by the Psychopathy Checklist-Revised). Indeed, childhood ratings of CU traits have been shown to predict psychopathic traits in adulthood (Burke, Loeber, & Lahey, 2007; Lynam, Caspi, Moffit, Loeber, & Stouthamer-Loeber, 2007).

Many features distinguish youth high in CU traits from those low in these traits. CU youth show deficits in affective perspective-taking, or the ability to make inferences about the emotional state of others (Anastassiou-Hadjicharalambous & Warden, 2008). They have more positive expectations for aggressive behavior and demonstrate less reactivity in response to the distress of others (Centifanti & Modecki, 2012; Viding, Fontaine, & McCrory, 2012). These adolescents may have a preference for novel or thrilling activities and show lower levels of trait anxiety and fearfulness (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999). Finally, CU traits are associated with fewer deficits in verbal intelligence and less emotional dysregulation compared to their low-CU counterparts (Salekin, Neumann, Leistico, & Zalot, 2004; Waschbusch, Walsh, Andrade, King, & Carrey, 2007).

Youth with significant CU traits tend to show deficits in reward and punishment processing. They demonstrate a more reward-oriented response style and insensitivity to punishment (Byrd, Loeber, & Pardini, 2014; Frick et al., 2003). In other words, they tend

to display an affinity for primed rewards despite a high threat of punishment, and show less arousal or response to enacted punishments. Discipline strategies, both at home and at school, focusing on punishment tend to be less effective with this group (Allen, Morris, & Chhoa, 2016).

Adolescents with significant CU traits represent a subgroup of antisocial youth that are especially resistant to treatment (Frick, Ray, Thornton, & Kahn, 2013; Hawes & Dadds, 2005). They demonstrate a greater number of conduct problems and show a more severe and stable pattern of aggressive behavior compared to other conduct-disordered youth (Byrd, Loeber, & Pardini, 2012; Chabrol, van Leeuwen, Rodgers, & Gibbs, 2011; Frick, Cornell, Barry, Bodin, & Dane, 2003). They also commit more than their fair share of delinquent behavior, and thus represent a particularly high-risk group (Frick & Viding, 2009; Lynam, 1997). One notable exception to this pattern comes from recent research which suggests that high-CU youth made comparable gains in treatment when they were able to form a strong therapeutic alliance with their therapist, suggesting social relationships may play an important role for these adolescents (Mattos, Schmidt, Henderson, & Hogue, 2016).

While these studies suggest CU-youth often engage in risky and impulsive behavior, the process of how these youth engage in risky decision making has been under-researched.

Adolescent Risk-Taking

Adolescence represents a period of increased involvement in risky behaviors, regardless of level of CU traits. Adolescents take more risks than adults, and early adolescents tend to take more risks than mid-late adolescents (Defoe, Dubas, Figner, &

van Aken, 2014). Research suggests risk-taking increases from childhood to adolescence as the brain engages in increased reward-seeking, and then risk-taking decreases into adulthood as self-regulation improves (Steinberg, 2008). This lag in cognitive control systems behind emotional reward systems creates a period of heightened vulnerability for reckless behavior during adolescence. Risk-taking is seen in real-world behaviors such as increased unprotected sex, alcohol use, and even getting more tattoos and body piercings (Carroll, Riffenburgh, Roberts, & Myhre, 2002; Kotchick, Shaffer, Forehand, & Miller, 2001).

A multitude of studies also suggest that adolescents are especially vulnerable to the presence of peers, which amplifies their already risky behavior (Gardner & Steinberg, 2005). So not only do adolescents take more risks than children or adults, but peer influences on risk-taking and decision making are stronger in adolescents. The proposed mechanism for this peer effect is changes in reward valuation. Research suggests that the presence of peers may sensitize regions of the brain associated with the anticipation of potential rewards (Chein, Albert, O'Brien, Uckert, & Steinberg, 2011; Smith, Steinberg, Strang, & Chein, 2015). Particularly, the ventral striatum and orbitofrontal cortex, which are associated with reward prediction and valuation, are activated by the presence of peers and predict subsequent risk-taking. This reward sensitization is seen in a preference for smaller, immediate rewards and reward seeking even in the face of negative outcomes (Smith, Chein, & Steinberg, 2014; Weigard, Chein, Albert, Smith, & Steinberg, 2014). Adolescents, especially in the presence of peers, are much more likely to make these riskier decisions even when reward and loss outcome information is explicitly presented to them (Smith et al., 2014).

Peer effects appear to be robust across setting and social relationship. Not only are adolescents influenced by peers with whom they have an established relationship, but also when adolescents merely believe they are being observed by an anonymous peer in a separate room (Weigard et al., 2014). Peers can also have an "active" or "passive" influence on decision making. For example, in a simulated driving study, peer "passengers" still influenced risky driving when explicitly instructed not to speak or provide feedback (Centifanti, Modecki, MacLellan, & Gowling, 2014). However, there is evidence to suggest that the quality of relationships can modulate peer influence. Adolescents who reported high peer support were buffered from the association between peers and risk compared to youth reporting high peer conflict (Telzer, Fulignia, Lieberman, Miernicki, & Galván, 2015).

Peer Relationships in Justice-Involved Adolescents

In line with this evidence on risk-taking and peers, juveniles are significantly more likely than adults to commit crimes in groups (Zimrig, 1981). Research suggests this is due to more than the fact that adolescents spend more time with peers than adults do, as studies demonstrate peers actively affect decision making (Csikszentmihalyi, Larson, & Prescott, 1977; Gardner & Steinberg, 2005). Affiliation with delinquent groups is also associated with increased rates of violent offending (Lacourse, Nagin, Tremblay, Vitaro, & Claes, 2003). This is especially apparent with gang membership. Longitudinal studies suggest delinquent behavior increases after entering a gang and decreases substantially after leaving (Thornberry, Krohn, Lizotte, & Chard-Wierschem, 1993).

The mechanisms involved in increasing delinquency in juvenile groups likely extend beyond increased risk-taking behaviors. There has been considerable attention

drawn to the effects of deviancy training and other forms of peer contagion (or the transmission of deviant behavior from one individual to a peer). Deviancy training specifically refers to communication and interactions that perpetuate delinquency. For example, in deviancy training, a positive response (such as laughing) in response to past examples or future suggestions of deviant behavior promotes those actions. The tendency to engage in violent talk among friendships predicts violent acts (Dishion, Eddy, Haas, Li, & Spracklen, 1997; Dishion, Spracklen, Andrews, & Patterson, 1996; Snyder, et al., 2005). However, the research examining the concrete effects of deviancy training is decidedly mixed. For example, youth assigned to foster care showed greater reductions in problem behavior than those assigned to larger group residential treatment (Leve & Chamberlain, 2005). Still, not all group residential programs produce negative effects. Lee and Thompson (2009) found that only 7% of residential participants showed increased problem behavior, and the increase in deviancy was associated with the density of deviant peers in the program. Also, a recent review of meta-analyses on treatment of antisocial youth revealed no negative effects of deviancy training (Weiss et al., 2005). While some studies suggest such an effect could occur, there is a lack of rigorous studies using random assignment (Gifford-Smith, Dodge, Dishion, & McCord, 2005). More research is necessary to focus on factors that reduce or enhance peer contagion effects in order to more properly inform public policy decisions. One factor that has yet to be fully explored is the potential effect of personality traits on peer influence. For example, do adolescents with certain personality configurations exert more influence on their peers than others?

CU Traits and Risk-Taking

A majority of research on psychopathic traits and risk-taking has focused on adults. In adults, psychopathy appears to be associated with self-reported risk-taking, accounting for unique variance beyond other antisocial symptoms (Hosker-Field, Molnar, & Book, 2016; Swogger, Walsh, Lejuez, & Kosson, 2010). Psychopathic traits have also been associated with increased risk-taking on the Balloon Analog Risk Task (BART) in a community sample of adults (Hunt, Hopko, Bare, Lejuez, & Robinson, 2005; Lejuez et al., 2002). The BART is a computer-simulated behavioral task of risk-taking that asks participants to accrue points by pumping up a balloon without passing the explosion point. One additional study showed psychopathic traits were associated with increased risk-taking on the BART in an offender sample (Snowden, Smith, & Gray, 2017). The researchers determined that this increase in risk-taking was driven by the Boldness domain of psychopathy, using the triarchic conceptualization of the construct. Boldness refers to high dominance, low anxiousness, and venturesomeness, whereas the triarchic factor of Meanness is most associated with callous-unemotional traits. However, in a contrast to these results, an alternative study of adult male inmates found no association between psychopathic traits and responses on the BART (Swogger et al., 2010).

In adults, several studies have shown that those with psychopathic traits actually tend to perform better on gambling tasks. They may take a more "logical" approach due to deficits in reward and punishment processing. Whereas many individuals would avoid a statistically advantageous option because of fear of its possible punishment, psychopaths may show decreased anxiety and fear in anticipation and response to punishment (Curry, Chester, & Viding, 2011). Some gambling tasks may represent a

situation in which failing to become risk-averse actually represents an advantage. Hughes and colleagues (2014) found that adult psychopaths (from both prison and the community) showed better performance on the Iowa Gambling Task (IGT), including increased advantageous choices even in the early, learning phase of the task. They determined that the antisocial facet of psychopathy (within Factor 2) was most relevant in predicting this performance on the task. Still, additional studies have shown both a negative correlation between psychopathic traits and performance on the IGT (psychopathic traits were associated with disadvantageous decisions) as well as no relationship between these two factors in incarcerated men (Mitchell, Colledge, Leonard, & Blair, 2002; Schmitt, Brinkley, & Newman, 1999). These inconsistencies may be due to differences in the samples (incarcerated versus community participants), measures of psychopathy, as well as task delivery, instructions, and incentives (Hughes, Dolan, Trueblood, & Stout, 2014). Overall, research on psychopathic traits and risk-taking in adults is mixed, similar to the research on adolescents.

In adolescents, much less research has looked at the link between CU or psychopathic traits and risk-taking. There is overwhelming evidence pointing to high rates of aggression and delinquent behavior among youth high in CU traits (Frick et al., 2014). Negative outcomes include increased rates of institutional misconduct, violent recidivism, probation violations, sexual offenses, and substance use above and beyond non-CU adolescents (Brandt, Kennedy, Patrick, & Curtin, 1997; Gretton, McBride, Hare, O'Shaughnessy, & Kumka, 2001; O'Niell, Lidz, & Heilbrun, 2003). However, risky decisions appear to be implied in this behavior, and greater understanding of the explicit decision-making processes of these youth is needed.

Two studies have examined broader psychopathic traits (as measured by the Psychopathy Screening Device and Youth Psychopathic Traits Inventory) and risk-taking in adolescents. Blair and colleagues (2001) found that community adolescents with psychopathic tendencies were less likely to avoid risky choices on a task akin to the IGT. Fairchild et al. (2009) also found that psychopathic traits were associated with increased risk-taking (on the Risky Choice Task) in a community sample of adolescents with conduct disorder.

Looking at CU traits specifically, a recent study of female offenders failed to find a relationship between the callous-unemotional subscale of the Antisocial Process Screening Device and the BART (Gothard, 2011). Marini and Stickle (2010) investigated callous-unemotional traits (using the Inventory of Callous and Unemotional Traits) and risky behavior in adjudicated adolescents using the BART. They too did not find an association between psychopathic traits and behavioral risk-taking as measured by average number of pumps on the BART. However, they did find evidence to suggest that CU traits predicted differences in reward responsivity as CU traits were associated with smaller increases in risk-taking following a reward. Adolescents with antisocial traits tend to show increased risky behavior after it is rewarded, thus CU traits may attenuate this response (Syngelaki, Moore, Savage, Fairchild, & Van Goozen, 2009). Ručević and colleagues (2018) also found this effect on the BART using a community sample of juveniles with CU traits. In addition, high-CU youth in their study tended to make more advantageous decisions on a child version of the IGT (the Hungry Donkey Task). They concluded that CU traits may actually facilitate heightened rationality when responding

to rewards and punishments, similar to Hughes et al.'s (2014) study with the IGT in adults.

Overall, Byrd et al. (2014) suggested that, based on existing studies, youth with broader psychopathic traits may have more consistent deficits in inhibiting risky, reward-seeking behavior compared to youth with CU traits. A more recent study lends support for this hypothesis: Fanti and fellow researchers (2016) found that adolescents with conduct disorder displayed impaired decision making, selective attention, and future orientation, irrespective of level of CU traits. However, youth high on CU traits without conduct disorder showed less risky decision making (on a driving game) than those with CU traits as well as conduct problems.

CU Traits and Peers

Peer influence of CU youth. There appears to be conflicting perceptions and research regarding the social relations of CU youth. Public stereotypes often describe psychopathic individuals as loners, committing solo crimes. A recent study suggests CU youth have poorer peer functioning, including decreased social competency and close friendship quality as well as increased loneliness (Haas, Becker, Epstein, & Frick, 2017). However, youth with high levels of conduct problems and CU traits may have better social problem-solving skills than youth high in conduct problems and low in CU traits (Waschbusch et al., 2007). In social situations, youth high in psychopathic traits had stable friendships and their friends did not rate the relationship as conflictual (Muñoz, Kerr, & Bešić, 2008). CU youth associate with a greater number of deviant peers (Pardini & Loeber, 2008; Kimonis, Frick, & Barry, 2004). Adolescents with significant CU traits are more likely to commit crimes in groups and affiliate with a gang (Osho, Joseph, Scott,

& Adams, 2016; Thornton et al., 2015). Thus, social relationships likely influence the behavior of CU youth (Ray et al., 2016). However, further research is needed examining the influence of peers on these adolescents. A recent study found that youth high in psychopathic traits were more influenced by exposure to delinquent peers in relation to greater institutional misconduct (Tatar, Cavanagh, & Cauffman, 2016). Conversely, Kerr and colleagues (2012) found that adolescents with high levels of CU traits were less influenced by peers' delinquency.

An extensive literature review revealed only one previous study that has examined the role of peer influence on risk-taking in adolescents high in CU traits in an experimental manner. Centifanti and Modecki (2012) employed Steinberg's classic paradigm, asking participants to complete the BART individually or in groups of three, with a community sample of adolescents. They found that youth high in CU traits took a comparable *number* of risks (as measured by average number of pumps of the balloon) as low-CU youth. However, their results suggested that higher levels of CU traits were associated with *quicker* decisions to take risks when in groups, particularly after punishment. The authors speculated this was due to an effort to exert power over their peers and display dominance. This is consistent with research demonstrating that CU traits are associated with more positive expectations for deviant social goals such as revenge, and youth high in these traits often report self-serving cognitive distortions (Anastassiou-Hadjicharalambous & Warden, 2008; Chabrol et al., 2011; Pardini, 2011). They also tend to view aggression as an effective means for dominating others, regardless of the potential suffering of others or punishments to themselves (Pardini, 2011; Pardini & Byrd, 2012). Replicating Marini and Stickle (2010), they also found that CU-youth did

not show increased risky responses following a reward. Youth with psychopathic traits may become particularly sensitized to the anticipation of rewards but not to the receipt of rewards (Murray, Waller, & Hyde, 2018).

In summary, competing hypotheses are presented for possible peer influence on CU risk-taking that require further investigation. On one hand, the presence of peers may further blind CU-youth to punishment, and lead to increased risk-taking because the social context highlights the need for dominance over others. Alternatively, CU traits may be associated with a lack of emotion and decreased responsivity in the face of reward and punishment, which is maintained even in the face of peers (Marsh et al., 2008; Swogger et al., 2010).

CU-Youth Influence of Peers. One final area of consideration is the impact that youth with CU traits exert on their peers. The limited research available suggests that adolescents with CU traits may wield a disproportionally strong influence on their peers. Adolescents with larger numbers of psychopathic traits have been more able to influence their peers and increase delinquent behavior (Kerr, Van Zalk, & Stattin, 2012; Kimonis et al., 2004). This may relate to their ability to manipulate and dominate others, and their requisite social skills to achieve these goals (Waschbusch et al., 2007). CU traits are also associated with greater leadership roles and planning in group crimes (Thornton et al., 2015). Psychopathic youth may tend to form relationships with adolescents low in self-esteem, with whom they exert an especially strong influence (Van Zalk & Van Zalk, 2015).

Deviant peer groups may be more or less influenced depending on the characteristics of the peer groups. While a peer effect on risk-taking has been well-

researched, little investigation has been made regarding the influence that CU traits may have on this relationship, and further, the impact of these relations on group behavior. Given youth with significant CU traits demonstrate high rates of deviancy and appear to be socially-integrated with their peers, more research on these relations is clearly needed.

The Present Study

The current study extended the literature on CU traits and adolescent risk-taking among delinquent adolescents. Centifanti and Modecki (2012) appear to be the first to use experimental manipulation to examine peer influence in youth with CU traits. The current study extended this previous research in several ways. First, the present study examined risk-taking in a group of justice-involved adolescents instead of a community sample. Youth involved in the juvenile-justice system represent a high-risk group in need of further research and intervention. Also, there are many potential opportunities for peer influence in the juvenile justice system, and it is important to understand these effects in greater detail. Second, this study used three separate risk-taking measures. Centifanti and Modecki's (2012) research was limited by reliance on the BART, and they failed to find greater risk-taking among CU-youth, unlike some previous studies. Our study attempted to provide a broader definition of risk-taking using multiple measures in order to help shed light on discrepant outcomes in previous studies. Lastly, the current study attempted to examine risk-taking at a group, as well as individual, level while taking into account CU traits.

This research has important implications for designing interventions for high-risk adolescents. Adolescence appears to be a critical period for increased risky decisions and delinquency, especially in the presence of peers. Interventions during this period have the

potential to create meaningful change in these youth's lives and prevent a lifelong pattern of offending. Furthermore, it is important to understand how peers influence each other and whether certain individuals exert a disproportionately large influence on delinquency. This has implications for designing group interventions and identifying high-risk individuals for more intensive, tailored treatment. Appropriate treatment can benefit individuals as well as the community by improving public safety and allocation of resources.

Research Questions

1. *How do CU traits influence risk-taking behavior?* Several previous research studies in adults and adolescents suggests that psychopathic traits are associated with increased risk-taking, though these results have yet to be extended to adolescents in experimental settings using measures of CU traits (Blair et al., 2001; Fairchild et al., 2009; Hunt et al., 2005; Marini & Stickle, 2010). Considering their association with real-world patterns of risky behavior, we hypothesized that a greater number of CU traits would be associated with increased risk-taking across the three behavioral measures.

2. *How do CU traits moderate the effect of peer influence on risk-taking?* Again, previous research investigating peer effects on CU-traits is limited and somewhat mixed. Centifanti and Modecki (2012) found that community male adolescents took quicker risks in the presence of peers, but not a greater number. Consistent with their initial finding, and anecdotal support from offending patterns among CU-youth, we hypothesized that CU traits would be associated with increased risk-taking within the group condition.

3. *How do individual-level CU traits influence group-level risk-taking?*

Contrary to perceptions of CU-youth as solitary offenders, research suggests these adolescents are socially integrated and influential (Kerr et al., 2012; Kimonis et al., 2004). They may take greater risks and strive for dominance in the face of peers; thus, it is possible that individuals high in CU traits will exert a stronger influence on their peer group's average risk-taking. Given the lack of previous research addressing this issue and our inability to assign group membership based on level of CU traits, this question represents an exploratory third hypothesis, and no specific predictions were made.

CHAPTER II

Method

Participants

Fifty-eight caregivers were approached by juvenile justice center staff regarding providing consent for their child to participate in the study. Six caregivers declined to provide consent for their children. Their reasons were not obtained as, per the approved procedure, they were asked to review and return to the consent form independently so justice staff were not informed of their decision. Of the remaining 52 youth who received parental consent, 48 were approached regarding providing assent (the other 4 adolescents were released from the detention center prior to their anticipated court date and were missed by the research team). Six youth participants declined to participate when approached, stating they were not interested at that time. Most expressed disinterest in completing the written measures and with the length of the study.

The final sample of participants consisted of 42 male adolescents age 13 to 18 (M = 15.2) who were detained in the juvenile-justice system at the time of data collection. Participants were adolescents recruited from the Olen Underwood Juvenile Justice Center in Conroe, Texas. The Olen Underwood Juvenile Justice Center is a maximum security facility providing short-term care for adolescents with alleged criminal offenses rated as Class B misdemeanors or greater (including offenses ranging from petty theft to murder) in Montgomery County, Texas, as well as 20 surrounding counties. The majority (40%) of the sample self-identified as Caucasian, 24% identified as Hispanic, 17% as African American, and 19% as Multiracial. The most commonly reported highest level of education for participants' mothers was high school degree (31%), and for participants'

fathers they were high school degree (20%) or less (18%). A majority of participants reported English was their first language, and 12% reported Spanish as their first language. Two participants reported involvement in the foster system. Participants self-reported this was their fifth arrest and fourth detention, on average. Five participants reported previous gang involvement.

Procedures

To be eligible to participate in the current study, adolescents were required to have a primary caregiver provide consent for participation and to be fluent in English (in both verbal and reading fluency). Parental consent was obtained by juvenile probation officers who received training in the collection procedure. Researchers then obtained written assent from the adolescent. Participants were asked to complete several risk-taking tasks either alone or in the presence of two peers. Tasks included three computerized measures of risk-taking. Consistent with institutional guidelines, participants were not compensated for their participation. Testing was completed in a single session lasting approximately one hour.

Participants were assigned to one of two conditions: *individual* or *group*. Due to constraints in the collection of parental consent, individuals were assigned to the group condition based on availability (i.e., when three adolescents with parental content were detained simultaneously, they were placed in the group condition) with the remaining individuals completing the individual condition. Adolescents in the group condition did not choose close peers with whom they participate; however, as a consequence of their simultaneous detention it was possible that the participants were known to each other. It is difficult to identify any readily-apparent, systematic differences between the two

conditions based on this type of assignment. The two groups were compared across demographic variables, and only one significant difference emerged. Individuals in the group condition reported a greater number of previous detentions ($t(39) = -2.23$, $p = 0.03$), or approximately five versus two previous detentions, on average. This difference was largely driven by two individuals in the group position who reported a high number of previous detentions (17 and 20 previous detentions). These individuals may represent outliers; however, there may have been a somewhat higher likelihood that individuals with more frequent detentions would be placed in the group condition as they had increased availability. Also of note, number of previous detentions was assessed via self-report and not able to be verified with collateral records.

In the individual condition ($n = 21$), participants completed the procedure, including all three computerized tasks, without the presence of peers. One researcher remained in the testing room to supervise administration, but did not directly observe the tasks or provide feedback regarding outcomes.

In the group condition ($n = 21$), participants completed the procedure in groups of three. Each participant was then randomly assigned to complete one of the three computerized tasks, which they completed while being observed by their two peers. Observing participants in the group condition were directed that they could provide feedback or recommendations to the task-taker, but the ultimate decision on that task lay with the individual task-taker, not the group. This is consistent to the directions used by Gardner and Steinberg (2005). Again, one researcher remained in the testing room to supervise.

After completing the three computerized tasks, participants were asked to complete a number of self-report written measures. All participants completed these measures independently (in the group condition, participants were seated separately to ensure confidentiality but remained in the same room). Finally, the participants were debriefed upon completion of the study.

Measures

Behavioral tasks. These computerized tasks were designed to simulate real world risk-taking but do not involve serious negative consequences. Participants were asked to accrue points or virtual money, though they were reminded that outcomes on the tasks did not result in real-life compensation. Instead of merely being asked what they *have* done in the past or *would* do in a hypothetical scenario, participants were asked to make and enact actual decisions. This took away reliance on purely self-report. Self-report measures of risky behavior have shown little correlation to behavioral tasks in previous research (Reynolds, Ortengren, Richards, & de Wit, 2006). Three separate tasks were chosen to gain a more complete understanding of risk-taking behavior as each task likely assessed unique aspects of decision making (Buelow & Blaine, 2015; Zhou, 2017). Previous research suggests that administering multiple risk-taking tasks (in their study, the BART and Angling Risk Task) does not affect performance on each individual task (Zhou, 2017). Standard computerized versions of the measures were administered using Inquisit (Inquisit 5, 2016).

1) The Balloon Analogue Risk Task (BART). On the BART, participants are asked to accrue points by pumping up a balloon without passing the explosion point (Lejuez et al., 2002). Risky behavior is rewarded up to a point (as participants earn points

for each pump of the balloon), though continued engagement leads to negative outcomes (participants lose the points earned on that balloon if the balloon pops). Participants were given 30 balloon trials in which to accrue as many points as possible. The point at which the balloon popped was variable throughout the trials, and participants were not given explicit information about the probability a balloon would pop on each trial. Risk-taking was calculated using the average number of pumps per balloon, excluding balloons that popped (the adjusted average score). Therefore, higher scores are associated with increased risk-taking. Outcomes on the BART have been shown to correlate with real-life risky behaviors, such as substance use and sexual promiscuity, as well as risky decision making in other laboratory tasks (Lejuez, Aklin, Zvolensky, & Pedulla, 2003; Lejuez et al., 2002; Reynolds et al., 2006). In addition, the BART related to increased risk-taking in adolescents with conduct problems (Humphreys & Lee, 2011).

2) The Angling Risk Task. The Angling Risk Task (ART) is a variant of the BART which allows for greater manipulation of the learning variables (Pleskac, 2008). For example, the number of rounds and whether participants are given explicit information about the likelihood of a negative outcome can be manipulated. The ART involves a simulated fishing tournament in which participants accrue virtual money (5¢) by catching a "good" fish (a red fish). However, if a "bad" fish (blue fish) is caught, the round ends and the money earned that round is lost. Participants were given 30 fishing rounds in which to accrue as many points as possible. Similar to the BART, participants were not given explicit information about the possibility of catching a red versus blue fish (the "cloudy day" condition was used, concealing the fish in the pond), which forced the participant to learn about how many potential fish are in the pond. The likelihood of

catching a blue fish increased for each red fish caught, as the fish are not returned to the pond post-catch (i.e., the "catch 'n' keep" condition, or sampling-without-replacement process, was used). Therefore, similar to the BART, this task involves sequential risk-taking, where the likelihood of experiencing a loss increases with each opportunity to gain a reward.

One difference of the ART compared to the BART is that the probability of a losing outcome is lower. There may be a ceiling effect to the BART, or a high probability of losing and ending the round when participants would have continued blowing up the balloon, which may make it more difficult to observe individual differences. There is a lower probability of losing on the ART, which is also a longer task to complete (there are 128 fish in the pond to catch from at the start). Risk-taking is calculated using the average number of casts per round, excluding rounds in which a blue fish is caught (the adjusted average score). Like the BART, higher scores are associated with increased risk-taking. The ART has been less widely used than the BART and there is limited reliability and validity data. However, outcomes of the "cloudy day" condition of the ART have been shown to correlate with self-reported impulsivity, and the "sunny day" condition correlates with sensation seeking and substance use in adults (Pleskac, 2008; Zhou, 2017).

3) The Iowa Gambling Task (IGT). The IGT is used to assess real-world decision making (Bechara, Damasio, Damasio, & Anderson, 1994). Participants are presented with four decks of cards and instructed to take one card at a time in order to maximize wins over 100 trials. Two decks are "risky" (resulting in greater short-term wins but also greater losses), while the remaining two decks are "safe" (resulting in more long-term

gains). During later trials of "risk" (trials 41 through 100), after which participants have had the opportunity to learn about the risks and benefits of each deck during the trials of "ambiguity," the most profitable strategy is to forego short-term reward in favor of more advantageous "safe" decks. Risky behavior is measured by calculating the number of "safe" deck choices minus "risky" deck choices. Therefore, on this task, lower scores are associated with increased risky decisions. A total risk score was calculated using only the trials of risk, or the number of "safe" deck choices minus "risky" deck choices during trials 41 through 100. The IGT has been used clinically with adolescents and has been shown to correlate with naturalistic risk-taking tasks (Buelow & Suhr, 2009; Schonberg, Fox, & Poldrack, 2011).

Self-report measures. Each participant completed several self-report measures. They completed them independently, regardless of condition.

Demographics Questionnaire. Participants completed a questionnaire of their demographic information, including age, sex, ethnicity, and education level. Additionally, information regarding their legal history (including number of arrests and detentions) and possible gang affiliation was assessed.

Inventory of Callous-Unemotional Traits (ICU). CU traits were measured using the Inventory of Callous-Unemotional Traits: Youth Self-Report Version (Frick, 2004). The ICU is a 24-item questionnaire that provides a comprehensive assessment of callous and unemotional traits in youth. The ICU was developed by expanding upon the Callous-Unemotional subscale of the Antisocial Process Screening Device (Frick & Hare, 2001) and has been developed into several different versions (including Youth Self-Report, Parent Report, and Teacher Report). The validity of the ICU has been supported in large

samples of community adolescents (α = 0.77) and juvenile offenders (α = 0.81), and found to have adequate internal consistency (Essau, Sasagawa, & Frick, 2006; Kimonis et al., 2008). Research suggests using the total ICU score best captures the general construct of CU traits and that variance in the subscale scores is largely driven by individual differences in the general factor (Ray & Frick, 2018).

Antisocial Process Screening Device **(APSD).** The APSD is a 20-item rating scale designed to assess the concept of psychopathy in youth (Frick & Hare, 2001). It includes sub-scales for CU traits, Impulsivity, and Narcissism. Originally designed in a parent- and teacher-report format, the newer self-report version was given to participants. The self-report version has been used with adolescent offender samples and demonstrated adequate internal consistency (Silverthorn, Frick, & Reynolds, 2001). The APSD builds upon the constructs of the ICU by also including an Impulsivity/Conduct Problems factor (α = 0.75). The decision was made to include the APSD due to previous research which has found different results on risk-taking tasks when assessing traits related to antisocial behavior in general versus CU traits more specifically.

Strengths and Difficulties Questionnaire **(SDQ).** The SDQ is a brief behavioral measure which assesses positive (prosocial behavior) as well as negative (internalizing [emotional and peer problems] and externalizing symptoms [conduct problems and hyperactivity]) attributes (Goodman, 1997). Participants completed the extended self-report version of the SDQ designed for 11 to 17 year olds (α = 0.82; Goodman, Meltzer, & Bailey, 2003). High correlations between the SDQ and the Child Behavior Checklist (CBCL) provide evidence for the concurrent validity of the SDQ and suggest it is a useful

measure of the adjustment and psychopathology of adolescents (Achenbach, 1991; Goodman & Scott, 1999).

Delinquent Activity Scale, Modified **(DAS).** The Delinquent Activity Scale, a modified version of the Self-Reported Delinquency Scale, was designed to assess the frequency of specific delinquent acts, as well as the contribution of alcohol and marijuana to these occurrences (Elliott, Ageton, & Huizinga, 1985; Reavy, Stein, Paiva, Quina, & Rossi, 2012). These measures have been used extensively with adolescent clinical samples as well as incarcerated juveniles (Reavy et al., 2012; Sibley et al., 2011). Thirty-seven items from the DAS were included in a modified version of this measure, including delinquent acts such as being rowdy in a public place, skipping school, violating curfew, and using marijuana. Identical to the original measure, participants were asked to report their age when they first and last engaged in the behavior as well as how many times the behavior occurred in the last year. In addition, rather than assessing how often these behaviors occurred in the context of marijuana, the response option was modified to ask participants to report on the number of times the behavior occurred alone (i.e., not with any friends or associates) in the last year in order to assess the contribution of peer involvement to these occurrences.

Barratt Impulsivity Scale, 11th Version **(BIS).** The BIS consists of 30 items designed to assess the construct of impulsiveness (Patton, Stanford, & Barratt, 1995). The BIS is one of the most widely used measures of impulsivity in research and clinical settings, including with adolescent populations. It has also shown adequate internal consistency in a sample of juvenile male offenders ($\alpha = 0.70$; Ireland & Culpin, 2006).

Analysis

Of note, although each condition consisted of 21 participants, due to the design of the study, each of the participants in the group condition completed only one of the three risk-taking tasks. Therefore, while each behavioral task has an *n* of 21 in the individual condition, only 7 participants completed each task in the group condition.

Given the small sample size, a Bayesian estimation approach was used to test our first two hypotheses regarding the effect of CU traits and peer influence on risk-taking (van de Schoot et al., 2014). A Bayesian analysis involves three elements: (a) prior knowledge on the parameter being tested, captured by the prior distribution (parameter estimate and its associated variance); (b) information provided by the data at hand (likelihood function); and (c) the posterior distribution, which represents the combination of the two previous elements and is derived using Bayes' theorem. However, Bayesian statistical methods offer advantages for small samples even when prior knowledge is not known or specified, as in the case of objective Bayesian statistics (i.e., when no prior distribution is specified; van de Schoot et al., 2014). Whereas frequentist methods assume the parameter of interest is assumed to be unknown, but fixed in the population, Bayesian methods assume that the parameter is uncertain and therefore can be described by a probability distribution (van de Schoot et al., 2014). When noninformative priors are used, such as in our case, the estimation process will rely closely on the data at hand (the likelihood function), and results will more closely resemble frequentist estimations (e.g., maximum likelihood estimation; Gelman, Carlin, Stern, & Rubin, 2004; Ozechowski, 2014). However, Bayesian analysis will still provide the advantage of the probabilistic interpretation of parameters (Zyphur & Oswald, 2013). The point estimate of the

parameter of interest represents the mean of the posterior distribution, and the stability of the estimate, on which inferences are made, is known as a credible interval (akin to conventional confidence intervals), which comprises the 2.5th and 97.5th percentiles from the posterior distribution (Ozechowski, 2014). Significant effects are demonstrated by a 2.5th and 97.5th percentile credible interval that does not contain 0 (0 representing no difference).

Parameters in these models are estimated using Markov Chain Monte Carlo (MCMC) estimation. MCMC is an iterative process in which a prior distribution is specified and posterior values for each parameter are estimated over many iterations, which in turn are used to construct the posterior distribution. MCMC is initiated from at least two randomly selected starting points to facilitate convergence of the iteration process (Zyphur & Oswald, 2013). Convergence is indicated graphically as well as statistically via the potential scale reduction (PSR; Asparouhov & Muthén, 2010). PSR indexes the ration of total variance across chains to the pooled variance within a chain. Smaller PSR values (e.g., PSR < 1.05) indicate that convergence has occurred. Because conventional model fit indices are based on ML estimation, Mplus provides an alternative fit index to evaluate model fit, the posterior predictive *p* (PPP) value, which is less sensitive than chi-square testing to model misspecification. A PPP value greater than .05 indicates good model fit (Asparouhov & Muthén, 2010).

CHAPTER III

Results

Table 1 provides the distribution of study variables and bivariate correlations among the main study variables. Several significant correlations emerged. The distribution of main study variables did not differ significantly from normality. Of note, several participants requested to terminate the study prior to completing all of the written self-report measures, including the ICU (n = 40) and APSD (n = 41).

Table 1

Descriptive statistics and bivariate correlations among main study variables.

	M	SD	ICU	APSD	BART	ART
ICU	28.00	9.86				
APSD	15.32	6.11	0.48**			
BART	25.99	11.13	0.04	0.06		
ART	31.86	15.43	0.11	-0.10	0.57**	
IGT	-3.78	14.70	0.18	0.23	0.11	0.09

Note. ICU = The Inventory of Callous-Unemotional Traits, Total score; APSD = Antisocial Process Screening Device, Total score; BART = Balloon Analogue Risk Task, Adjusted average score; ART = Angling Risk Task, Adjusted average score; IGT = Iowa Gambling Task, Advantageous minus disadvantageous selections for Trials 41 to 100 (trials of ambiguity).
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The mean ICU score was 28.0 (SD = 9.86). As expected from previous research, ICU scores were significantly positively correlated with APSD scores (r = 0.25, p = 0.002). In addition, ICU total scores were significantly positively correlated with conduct problems (r = 0.49, p = 0.002) but not hyperactivity (r = 0.05, p = 0.76) as measured by the externalizing scale of the SDQ. Youth with high ICU scores tended to report fewer emotional problems (r = -0.36, p = 0.025) and prosocial behaviors (r = -0.59, $p < 0.001$), as measured by the SDQ. ICU scores were trending toward a significant correlation with

BIS impulsivity scores ($r = 0.32$, $p = 0.05$). ICU scores were positively correlated with endorsing a greater number of different delinquent acts on the DAS ($r = 0.45$, $p = 0.007$), but they were not significantly correlated with number of previous arrests ($r = 0.24$, $p = 0.89$) or detentions ($r = -0.18$, $p = 0.26$), per adolescents' self-report.

The mean APSD score was 15.32 ($SD = 6.11$). APSD scores were significantly positively correlated with externalizing scores on the SDQ ($r = 0.64$, $p < 0.001$), including conduct problems ($r = 0.58$, $p < 0.001$) and hyperactivity ($r = 0.48$, $p = 0.002$), and impulsivity scores on the BIS ($r = 0.78$, $p < 0.001$). There were no significant correlations between APSD scores and ratings of internalizing symptoms (including emotional problems and peer problems) or prosocial behaviors on the SDQ (all p's > 0.05). Similar to the ICU, APSD scores were positively correlated with endorsing a greater number of different delinquent acts on the DAS ($r = 0.60$, $p < 0.001$), but they were not significantly correlated with number of previous arrests ($r = -0.08$, $p = 0.61$) or detentions ($r = -0.12$, $p = 0.45$).

Neither the ICU nor APSD was significantly correlated with either of the behavioral tasks (all p's > 0.05). Scores on the BART were significantly positively correlated with scores on the ART ($r = 0.57$, $p = 0.007$). Scores during the trials of ambiguity on the IGT were not related to scores on the BART or ART ($r = 0.028$, $p = 0.903$; $r = 0.001$, $p = 0.998$).

Next, we compared group and individual condition scores across the three behavioral tasks using independent samples t-tests. Differing from previous research, participants in the group condition did not take significantly more risks on the computerized measures than participants in the individual condition. This was true for the

BART ($t(26) = -0.41$, $p = 0.69$, $d = 0.17$), ART ($t(26) = 0.84$, $p = 0.41$, $d = 0.36$), and IGT ($t(25) = 0.43$, $p = 0.68$, $d = 0.29$). We also compared group and individual condition scores across the self-report measure. Participants in the group condition reported significantly greater levels of CU traits on the ICU ($t(38) = -2.83$, $p = 0.007$, $d = 0.90$). There were no significant differences across the remaining self-report written measures (all p's > 0.05).

Bayesian Analysis

To examine the effect of CU traits on risk-taking, the ICU (independent variable) was regressed on the three behavioral risk tasks (three dependent variables) using multiple linear regression with Bayes estimation. Separate models were run for the group and individual conditions, allowing us to examine the differential role of CU traits in the two conditions. Default, uninformative priors were used in Mplus (version 7.3; Muthén & Muthén, 1998-2018). The model was estimated with two chains and with 40,000 iterations. Within the individual condition model, a PSR value below 1.05 indicated the model converged and a PPP value greater than .05 indicated good fit to the data ($PPP = 0.294$). Similarly, within the group condition model, a PSR value was below 1.05 and the PPP value greater than .05 ($PPP = 0.281$). Posterior distribution results from these models are presented in Table 2.

Table 2

Results of multiple linear regressions with Bayes estimation with callous-unemotional traits as a predictor of risk-taking behavior.

	Inventory of Callous-Unemotional Traits (ICU)									
	Individual Condition (n = 21)					Group Condition (n = 7)				
	slope	*SE*	*p*	*CI*	*d*	*slope*	*SE*	*p*	*CI*	*d*
BART	0.03	0.34	0.46	-0.64-0.71	0.03	0.19	21.12	0.46	-21.73-25.21	0.04
ART	0.25	0.47	0.29	-0.68-1.19	0.14	-0.52	68.57	0.42	-34.91-38.61	-0.09
IGT	0.44	0.51	0.18	-0.57-1.44	0.21	-0.23	51.60	0.47	-26.90-26.53	-0.04

Note. ICU = The Inventory of Callous-Unemotional Traits, Total score; BART = Balloon Analogue Risk Task, Adjusted average score; ART = Angling Risk Task, Adjusted average score; IGT = Iowa Gambling Task, Advantageous minus disadvantageous selections for Trials 41 to 100 (trials of ambiguity).

There were no significant effects predicting task performance with the ICU, in either the group or individual condition. However, there was a small effect of the ICU predicting results on the IGT in the individual condition; individuals with higher ICU scores tended to perform better on the IGT in the individual condition. This effect was not present in the group condition.

Subsequently, this procedure was repeated looking at a broader measure of antisocial traits (using the APSD instead of the ICU), with the APSD being regressed on the three risk-taking tasks within both the individual and group condition. Within the individual condition model, a PSR value below 1.05 indicated the model converged and a PPP value greater than .05 indicated good fit to the data (*PPP* = 0.294). Similarly, within the group condition model, a PSR value was below 1.05 and the PPP value greater than .05 (*PPP* = 0.283). Posterior distribution results from these models are presented in Table 3.

Table 3

Results of multiple linear regressions with Bayes estimation with antisocial traits as a predictor of risk-taking behavior.

	Antisocial Process Screening Device (APSD)									
	Individual Condition (n = 21)					Group Condition (n = 7)				
	slope	*SE*	*p*	*CI*	*d*	*slope*	*SE*	*p*	*CI*	*d*
BART	-0.33	0.47	0.23	-1.27-0.61	-0.18	1.94	26.71	0.12	-8.78-13.79	0.56
ART	-0.32	0.67	0.31	-1.65-1.01	-0.12	0.45	54.28	0.45	-40.55-37.12	0.05
IGT	0.72	0.71	0.15	-0.69-2.12	0.25	-2.41	66.71	0.33	-70.72-60.16	-0.26

Note. APSD = Antisocial Process Screening Device, Total score; BART = Balloon Analogue Risk Task, Adjusted average score; ART = Angling Risk Task, Adjusted average score; IGT = Iowa Gambling Task, Advantageous minus disadvantageous selections for Trials 41 to 100 (trials of ambiguity).

Again, there were no significant effects predicting task performance with the APSD, in either the group or individual condition. There was a small to medium effect of the APSD predicting results on the IGT in the individual condition; individuals with higher APSD scores tended to perform better on the IGT in the individual condition. However, in the group condition this was reversed, with a small to medium negative effect size with higher APSD scores predicting worse performance on the IGT. Regarding the BART, there was a small effect of the APSD predicting outcome on the BART in the individual condition; higher scores on the APSD were associated with decreased risky decisions on the BART. In the group condition, there was a large effect of the APSD predicting outcome on the BART. In this condition, higher APSD scores were associated with increased risk-taking on the BART.

The ART did not perform as expected across conditions and predictors. Despite a high correlation with the BART, it did not perform in a similar pattern. In addition, the ART showed an inverse pattern of performance on the ICU versus the APSD, despite a

high correlation between the two self-report measures. Possible explanations for this are discussed below. Therefore, ART results are presented above but effect sizes are not interpreted.

Also, we initially planned to examine group-level risk-taking to determine if group levels of CU traits predicted risk-taking. We planned to use a multilevel mixed-effects linear regression model with risk-taking as the dependent variable to account for the possible dependence of observations produced by the group structure. However, given the small sample size of the group condition, it was not possible to examine our third, exploratory hypothesis.

CHAPTER IV

Discussion

This study examined the role of callous-unemotional traits and peer influence on risk-taking. Despite an overwhelming amount of evidence that suggests adolescents with antisocial traits, and especially significant callous-unemotional traits, engage in frequent risky behaviors, insufficient evidence has examined their decision making in real time. This study examined risk-taking using several behavioral tasks. The current study is the first to examine peer influence and callous-unemotional traits in a justice-involved adolescent sample using quasi-experimental manipulation.

Unexpectedly, no significant differences in risk-taking emerged between participants in the group versus individual condition, irrespective of level of CU traits. Previous studies suggest there is a robust effect of peer presence on increased risky behaviors for adolescents when manipulated experimentally in the laboratory (Gardner & Steinberg, 2005). This effect has been found even when the "observing" peer is an anonymous individual in another room or when peers are instructed to behave passively and not speak (Centifanti et al., 2014; Weigard et al., 2014). These laboratory results mirror real world effects which show adolescents take more risks than adults and are more influenced by peers (Defoe et al., 2014; Gardner & Steinberg, 2005). However, per an extensive literature review, each of the previous studies which have utilized Steinberg's classic manipulation paradigm used a community sample of adolescents. To our knowledge, our study is the first time this manipulation has been used with justice-involved youth.

Several possible explanations exist for this null finding. First, our study is not the first which failed to find a peer effect during behavioral risk tasks in adolescents. Centifanti and Modecki (2012) found adolescents were actually more cautious in the group condition, perhaps because one participant was in charge of making decisions for the entire group. Bexkens et al. (2018) also did not find any differences in risky choices on the BART between a peer and solo condition for youth with behavior disorders (including Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, and Oppositional Defiant Disorder). While recruited from schools, their sample of male adolescents (age 12 to 18) with externalizing problems represents an overlapping demographic with youth within the juvenile-justice system, as in our study. These authors suggested that their unexpected null result related to differences in reward sensitivity. Adolescents with conduct problems tend to show even steeper discounting of future rewards than youth without conduct problems (White, Lejuez, & De Whit, 2008). In Bexkens and colleagues' study, adolescents were not rewarded until the completion of the task, and it is possible they did not place a high value on this future reward when completing the task and were less motivated to perform advantageously, whether in the presence of peers or not. Similarly, in our study, participants were told their total accumulation of virtual money at the end of the task but they did not receive any actual monetary compensation or tangible reward. It is possible that this low-level incentive did not sufficiently prime the reward response for youth with conduct problems.

There is extensive research on peer contagion and deviancy training which suggests that youth with conduct problems and other externalizing symptoms are heavily influenced by peers in their daily actions (Lacourse et al., 2003; Vitaro, Tremblay, &

Bukowski, 2004). Therefore, it is more likely that our insignificant finding is an effect of the tasks used rather than evidence that these high-risk adolescents are especially resistant to the influence of peers. Most previous research studies using this paradigm have used risk tasks other than the BART and IGT (most commonly, driving games, in which participants must choose to stop driving a car before the light turns red). There have been inconsistent research findings using the BART and IGT in the past, especially with offender samples (Hughes et al., 2014; Mitchell et al., 2002; Schmitt et al., 1999; Snowden et al., 2017; Swogger et al., 2010). Significant conduct problems or detention/incarceration may represent a confounding variable. It is also likely that how these tasks are delivered, explained, and incentivized has a significant effect on outcome, such that comparing outcomes on two studies which use the same task but with different parameters or populations may be misleading. The possibility of a ceiling effect with these measures was explored given the high-risk population. However, at least on the BART, the average number of pumps per individual in our study was relatively lower than in previous adolescent studies, even with community samples. This lends support to the hypothesis that these youth were not overly motivated to obtain the rewards presented by our study.

In addition, it is possible that there were confounds in our manipulation of the group versus individual condition. First, a graduate-student researcher was present in the room during the individual as well as group condition due to supervision requirements. The researcher did not watch the computer screen while the participants completed the behavior tasks but they were still nearby. While not of the same age cohort, it is possible that the researchers were close enough in age (and removed enough from the authority of

detention center staff) to create somewhat of a peer influence. In addition, participants were detained with their fellow peers and recognized many of their peers would be completing the same tasks. The testing environment within the detention center may have been sufficient to prime peer effects. Therefore, the individual condition may still have reflected significant peer influence. Still, we would expect to find an even stronger effect of peer influence in the group condition, given peers were directly observing their performance. Although participants in the group condition were instructed they could speak and provide feedback, most youth in this condition sat quietly, possibly due to the length of the study and lack of engagement. Research suggests peer influence is stronger when peers provide guidance and are more active, which may partially account for this diminished result (Centifanti et al., 2014). As elaborated above, there are several possible explanations for our null peer effect finding. However, our results, in conjunction with the two previous studies noted, suggest it may be overly simple to consider peer effects on adolescent risky behavior to be ubiquitous and constant. The effect may not be so robust as to be immune to context and other factors that drive behavior, which should all be taken into account when exploring decision making. In particular, more research is needed on these effects in adolescents with conduct problems and externalizing symptoms.

Interestingly, although no differences in risk-taking were seen between the group and individual conditions, participants in the group condition reported significantly higher levels of CU traits on the ICU (but not on the APSD or other self-report measures). This may suggest that the group condition primed some of the traits associated with callous-unemotionality (e.g., lack of emotional expression, focus on personal gain).

Participants completed the self-report measures after the behavioral tasks and in the same room as fellow group members, although responses were kept confidential. Youth with higher CU traits often tend to perceive higher CU traits in their peers as well (Mahaffey & Marcus, 2006). This assumed similarity after observing peers' behavior may have in turn led to amplification of participants' ratings of their own CU traits. The hazards of using self-report measures are often discussed, but one potential confound that may be underemphasized in the current self-report research is how the context of where they are completed affects outcomes. Still, it is not clear why the group context may have affected ratings of CU traits but not broader self-ratings of antisocial traits or other measures. An alternative hypothesis for this finding is that the difference was due to our non-random assignment, as discussed further below.

Our primary hypotheses predicted that higher CU traits would be associated with increased risk-taking, and that peers would exert an even stronger influence on risk-taking for youth high on CU traits. Overall, CU traits did not significantly predict outcomes on any of the three risk-taking tasks. This was true overall as well as within the group and individual conditions. However, some different effects emerged between the behavioral tasks, between self-report measures, and between conditions. We have cautiously interpreted the size of these effects in light of the previous research.

Previous research suggests that risk-taking does not represent a unitary construct. Rather, different risk tasks likely measure different aspects of risky decision making (Buelow & Blaine, 2015; Zhou, 2017). Therefore, although similar patterns were seen across the BART and IGT, it was expected that our behavioral tasks did not perform identically. In previous studies, outcomes on the BART and IGT have not shown

significant correlations with each other (Buelow & Blaine, 2015; Schonberg et al., 2011). The IGT incorporates learning of contingencies as the task progresses, but there is less opportunity for learning on the BART because there are no fixed probabilities from round to round. Therefore, the IGT incorporates more "cold" decision making (or deliberate weighing of risks and benefits), especially in the later trials of risk, whereas the BART relies more on "hot" emotional reactions.

In the case of the ART, however, it did not perform in a consistent or expected pattern across conditions and predictors. Despite a high correlation with the BART, it did not perform in a similar manner. In addition, the ART showed an inverse pattern of performance when using the ICU versus the APSD, despite a high correlation between the two self-report measures. The ART is the least widely used of our three behavioral tasks and its utility is debatable. Despite many similarities to the BART, in our study the ART took longer to complete due to the parameters used (i.e., the number and distribution of fish). A greater number of responses occurred per round, on average, which means a larger percentage of responses were rewarded rather than punished. During our study, participants may have had decreased motivation during this task, resorting to random responding rather than demonstrating inhibition of reward-seeking behavior or intentional decision making with each response. Therefore, it is likely that variations in its performance relate more to random effects rather than meaningful differences, and the decision was made not to interpret effect size differences (which were all negligible) on the ART. Further research demonstrating its validity is needed, including research on the effects and validity of using different permutations of its multiple, adjustable parameters.

CU traits, when measured specifically using the ICU, did not predict risky decisions on the BART in either the group or individual condition. This is consistent with several previous studies which have failed to find a relationship between CU traits and overall number of risky responses on the BART in adolescents (Marini & Stickle, 2010; Centifanti & Modecki, 2012). On the IGT, a small effect was found with CU traits predicting more advantageous responding in the individual condition. This may be consistent with two previous studies (one with adults and one with adolescents) which found that psychopathic traits related to a similar advantage on an IGT task (Hughes et al., 2014; Ručević, Borovac, Vučković, & Krupić, 2018). However, this advantage was not seen in the group condition, where there was no relation between CU traits and performance on the IGT.

Larger effects tended to be found when assessing traits related to antisocial behavior, or to the broader concept of psychopathy, using the APSD. Youth with greater psychopathic traits tended to have a small advantage on the BART and IGT in the individual condition. However, in the group condition, greater psychopathic traits predicted an increase in risk-taking on the BART and IGT. Again, note that the sample size was small and results should be interpreted cautiously, especially within this group condition.

This pattern of relatively larger effects when measuring broad psychopathic traits versus narrow CU traits is generally consistent with previous research. Of the handful of previous studies using risk tasks with adolescents, the two which measured psychopathic traits found a relationship with overall risk-taking while the three which measured CU traits did not (Blair et al., 2001; Centifanti & Modecki, 2012; Fairchild et al., 2009;

Gothard, 2011; Marini & Stickle, 2010). In addition, in studies of adult psychopathy and risk, research suggests that factors other than affective, callous-unemotional features show the greatest association with outcomes (Hughes et al., 2014; Snowden et al., 2017). This suggests that risk-taking may be less specific to the core affective features of psychopathy. Byrd and colleagues (2014) made this hypothesis, but they also noted that the studies measuring CU traits had all relied only on the BART at that point. Our study strengthens this hypothesis by including results of the IGT, which show a similar pattern. The antisocial features of psychopathy (such as poor behavior control, impulsivity, and irresponsibility) may make youth more vulnerable to risky decisions than the affective features, at least on laboratory tasks. However, it is interesting to note that measures of impulsivity have not reliably related to outcomes on the BART, nor did impulsivity reduce the significance of CU traits (Hunt et al., 2005; Marini & Stickle, 2010). Possibly, there may be an interaction between the psychopathy features such that adolescents who are high on all traits are at an especially high risk of delinquency.

In sum, our pattern of results suggests that psychopathic traits may relate to a small advantage on risk tasks when completed alone. Our study joins limited previous research which suggests that psychopathic traits may represent an advantage on gambling tasks, especially where it is beneficial to be planful and logical rather than reacting emotionally to rewards and losses (Fanti, Kimonis, Hadjicharalambous, & Steinberg, 2016; Hughes et al., 2014; Osumi & Ohira, 2010). This result is not necessarily inconsistent with previous adolescent studies with the BART which showed that youth with CU traits remained fairly rational in the face of successive wins (Centifanti & Modecki, 2012; Marini & Stickle, 2010). High-CU adolescents showed fewer increases

in their responses following a rewarded round. The size at which balloons popped on the BART was variable and had no relation to the previous round; therefore, taking more risks after a successful round may, in fact, be an irrational strategy.

This small advantage seemed to disappear when the tasks were completed in the presence of peers. This result is supported by analysis of adolescent group crime which suggests that youth with conduct problems and psychopathic traits are influenced by social relationships (Osho et al., 2016; Ray et al., 2016; Thorton et al., 2015). Although Centifanti & Modecki (2012) did not find that high-CU youth took more risks in groups, they did find that these adolescents were especially quick to respond following a loss when surrounded by their peers, suggesting some peer influence. In social scenarios, youth with CU traits likely have different goals than when they are alone. They may value dominance and respond to loss by immediately seeking to re-establish power (Pardini, 2011; Pardini & Byrd, 2012). In adolescents, the presence of peers sensitizes regions of the brain associated with rewards. CU-youth tend to show a reward-oriented response style, or a preference for approaching rewards over avoiding punishment. They demonstrate decreases in their response to punishment when rewards are primed (Frick et al., 2014). Therefore, based on these changes in reward valuation, the presence of peers may be problematic for psychopathic youth. Adolescents with CU traits in our study may not have found the virtual payout of the computer tasks to be inherently very rewarding, leading to advantageous responding. The addition of peers may have heightened the value of this reward and introduced a new reward (e.g., social dominance), leading to less advantageous responding. While some lessening of emotional responses to reward and punishment may represent an advantage on risky games, complete abandonment of fear

of punishment in favor of chasing rewards likely leads to problematic and disadvantageous choices.

Overall, these interpretations represent hypotheses and firm conclusions should not be drawn from these limited effects or the inconsistencies in previous research. Our results should be interpreted with caution due to the small sample size. Also, it is important to keep in mind that none of these effects reached the level of significance. Our study joins several previous studies which have failed to find significant differences in risk-taking in the laboratory with adolescents high in CU traits. This study had the advantage of including multiple measures of risk, suggesting that this null finding is not merely a product of the BART. Centifanti and Negan (2018) recently published a study assessing CU traits and risk-taking (peer effects were not included) in a large community sample of adolescents. Again, they found no relationship between CU traits and decision making on the BART or a driving game (Stoplight; Chein et al., 2011).

There is an overwhelming amount of evidence that exists suggesting CU traits are associated with severe aggressive behaviors, stable delinquency, and risky, problematic behavior such as institutional misconduct, violent recidivism, probation violations, sexual offenses, and substance use (Brandt et al., 1997; Byrd et al., 2012; Chabrol et al., 2011; Frick et al., 2003; Frick & Viding, 2009; Gretton et al., 2001; Lynam, 1997; O'Niell et al., 2003). Therefore, the question is raised, why do they not demonstrate similarly risky behavior on naturalistic decision making tasks in the laboratory? This is not to make an overreaching statement that they show *no* differences in risky behavior in a lab setting, as small differences with CU traits have emerged. However, our research joins a growing

number of studies to suggest that these differences are not nearly as large as what would be expected given these adolescents' real-world behavioral outcomes.

Several possible explanations exist for these findings. First, as discussed previously, it is possible other factors of psychopathy are more directly related to risk-taking than affective, CU traits. Psychopathy is a multifaceted concept, and it may be that CU traits interact with more behavioral traits to increase risk of problematic behaviors. Indeed, youth with multiple psychopathic traits showed more stability in future antisocial outcomes compared to youth with CU traits alone (Andershed, Colins, Salekin, Lordos, Kyranides, & Fanti, 2018). An alternative explanation involves how these youth assign value to and react to rewards and punishment. Youth high in CU traits may place value on different goals. In laboratory tasks, they may not place much value on the rewards (e.g., virtual money) or punishments (e.g., a balloon popping). In the real world, however, they may place higher value on the rewards of risky behavior (such as bodily sensation, in the case of risky sex) while discounting possible punishments (such as catching a disease or unwanted pregnancy). This fits with existing research suggesting CU traits are especially associated with instrumental forms of aggression (which intends to achieve a goal), while conduct problems in general are more associated with reactive forms of aggression (which occurs in response to provocation; Flight & Forth, 2007; Frick et al., 2014). It is likely of vital importance to understand what motivates this group of adolescents. However, it should also be noted that differences in reward and punishment responsivity on a task do not always relate to differences in overall risk-taking. Consider the previous adolescent studies using the BART, which found differences in responsivity following rewards and punishments for youth high in CU traits but no differences in

overall level of risky decisions (Centifanti & Modecki, 2012, Marini & Stickle, 2010). Therefore, studying reward and punishment sensitivity with this group is not synonymous with studying decision making.

Study Limitations

As previously stated, one significant limitation of the current study is the small sample size resulting from difficulties in collecting parental consent. This makes it especially difficult to draw conclusions about the group condition, despite our research goal of examining the effect of peer influence on individuals and groups. Our failure to find differences in risk-taking between the individual and group conditions, regardless of CU traits, was also unexpected. This sheds some doubt on drawing further conclusions from the instruments used, as peer influence was previously thought to be a robust effect in the laboratory with adolescents. However, ours is not the first study which failed to find differences in a peer versus solo condition for youth with conduct problems, which suggests further research is needed to determine why these juveniles responded differently in this classic research design.

Another limitation of the current study was use of the ART, which has not received as much research validation as other laboratory tasks. In future studies, it would be important to extend these results with additional, more widely used instruments. It may be particularly helpful to include a driving game task in future studies (e.g., "Stoplight" or "Chicken"), which would help provide a more direct comparison to results found in previous studies on adolescent peer influence (Chein et al., 2011; Gardener & Steinberg, 2005; Sheldrick, 2004).

Third, there are potential complications regarding our assessment of CU traits using the ICU. As previously noted, youth in the group condition tended to endorse significantly greater levels of CU traits. It was not predicted that the group manipulation would affect outcomes on the self-report measures. Ideally, participants in the group condition would have completed the self-report measures more independently (e.g., in a separate room). In addition, it would be helpful to counterbalance the order of the self-report measures and behavioral tasks in the future. The decision was made to administer the self-report measures second due to concerns that responding to measures assessing CU traits, psychopathic tendencies, externalizing symptoms, impulsivity, and delinquent behavior might prime more risky or extreme responses on the computer tasks. However, it may be possible that the reverse occurred, or that observing and engaging in risky decision making on the behavioral tasks increased self-perceptions of CU traits. In addition, our study relied solely on self-report measures of CU traits. The adolescent self-report version of the ICU shows only modest cross-rater agreement with the parent-report version (Seagrave & Grisso, 2002; White, Cruise, & Frick, 2009). Collecting collateral reports of these traits may have given us a fuller picture of the effect of callous-unemotionally. However, it is helpful to note that a previous study with the BART used multi-informant scores for the ICU and found similar results (Marini & Stickle, 2010).

Furthermore, we did not assess the reading level of participants to ensure they could adequately comprehend the material, raising further concern about the validity of participant self-report. Adolescents were excluded from the study if they were not fluent in English and all participants were in the seventh grade or above. The measures chosen have all been used and validated with adolescents in this age range in the past as well.

However, youth with conduct problems and involvement in the juvenile-justice system may show greater deficits in reading abilities and school performance (Katsiyannis, Ryan, Zhang, & Spann, 2008), and it is possible that the self-report measures in our study placed a high demand on the participants. In particular, participants appeared to struggle with the complexity of the response structure on the DAS (e.g., some participants reported engaging in a behavior more times alone in the last year than they reported they had engaged in it total, both alone and with peers). However, it is a positive indicator that the measures generally correlated with each other in the expected directions, which suggests the self-report measures tended to capture their intended constructs.

In addition, it is important to note that the current study only included male adolescents and results should not be broadly generalized to all females with conduct problems or CU traits. The construct of CU traits is not as widely studied in females; some suggest these traits are less common in females but function very much the same as for males, while others suggest there are important differences (Pechorro et al., 2013). Similar studies assessing CU traits and risk-taking with both males and females found a different pattern of responses across genders (Centifanti & Modecki, 2012).

Finally, the current study did not rely on purely random assignment of conditions. If three adolescents whose caregivers had provided consent were detained at the same time, they were placed in the group condition. Otherwise, they participated in the individual condition. Few, if any, systematic differences were anticipated between the two conditions based on this assignment. However, participants in the group condition tended to report higher levels of CU traits and a greater number of previous detentions, as previously discussed. There may have been a higher likelihood that individuals with more

frequent detentions (and possibly associated levels of CU traits) would be placed in the group condition because they had increased availability due to more frequent (and possibly longer) detentions. Therefore, the group condition may represent a sample with more severe conduct problems and psychopathology.

Another outcome of this type of assignment was that in one of the group triads, two of the participants were co-defendants (detained at the same time after the same alleged offense) and known to each other prior to detention. In our study, we did not have a method to control for level of prior association between the participants. As an example, there were several housing pods at the juvenile justice center in which the participants were detained. If groups happened to consist of members from the same housing pod, they were more likely to be known to each other and have a previous relationship. Research indicates peer influence is seen in adolescents even when they are being observed by anonymous peers, which suggests there would still be an influence of the group manipulation even if the participants were strangers to each other (Weigard et al., 2014). However, friends may exert a greater influence than acquaintances; thus, the peer effect may have been stronger in some groups compared to others (Mcphee, 1996). In future research, it would be ideal to randomly assign participants to both condition and group triad, if possible. Also, the inclusion of a control condition of "healthy" adolescents would help delineate which deficits are specific to this high-risk population and which are indicative of more normative risk-taking in adolescents (Byrd et al., 2014).

Implications and Future Directions

While taking these limitations into account, this study offers several important strengths. This was the first study to use multiple risk-taking measures while assessing

CU traits and peer influence. This strengthens the hypothesis that high-CU youth tend to show few differences in laboratory risk-taking tasks, since null findings are less likely to be due to the inability of a single measure to capture risky decisions. The different tasks used in the current study likely capture different aspects of risk-taking, yet CU traits were not strongly associated with differences in risk-taking on any of these measures. In addition, our study consisted of a sample of justice-involved youth. Although this may limit the generalizability of the results to community adolescents, these youth represent a group in high danger of engaging in risky, real-life behaviors and greater understanding of their decision making in these scenarios is needed. Lastly, our participants represented a diverse sample generally consistent with the ethnic composition of adolescents in the US.

This study suggests that it is important to consider more than just CU traits when predicting risk-taking. Considering psychopathic traits more broadly may help in assessing the likelihood of engaging in risky behavior. Measurements of CU traits have shown to be important in identifying a subset of conduct-disordered youth who have a unique constellation of traits and tend to engage in severe and stable delinquency. However, several researchers have recently suggested that limiting focus too narrowly on CU traits is less informative than considering psychopathy as a multidimensional concept (Andershed et al., 2018; Salekin, Andershed, Batky, & Bontemps, 2018). It may be important to consider these other traits (e.g., narcissism, impulsivity, disinhibition) when examining why youth with concurrent CU traits choose to engage in risky behaviors or not.

This study provided some hypotheses on the role of CU traits and peer influence in predicting risky behavior. However, in general it highlighted the need for a better understanding of how high-risk adolescents, particularly those with significant CU traits, make decisions in the real world. Despite engaging in frequent delinquent behaviors in their daily life, these youth did not show large increases in their risky decisions on laboratory tasks. This suggests that youth with high levels of CU traits are not indiscriminately risky, or risk-seeking for its own sake. In other words, all rewards are unlikely to be valued equally, and risk-taking itself may not be particularly rewarding. This is interesting to consider in conjunction with recent neuropsychological research which suggests that youth with psychopathic traits tend to show a weaker reward response in reaction to substance use, and this is primarily driven by Factor 1 callous-unemotional traits (Vincent, Cope, King, Nyalankanti, & Kiehl, 2018). Yet, CU traits are positively associated with increased and early drug use, suggesting there may be other motivations for this behavior. Even in adults, the primary variant of psychopathy (associated with callous-unemotionality) is associated with less diverse risk-taking than secondary psychopathy (characterized by antisocial and impulsive behaviors; Lyons, 2015). With this population, it is likely especially important to determine what these youth do find rewarding. This will help us determine how they go about pursuing these rewards, despite negative consequences to themselves and others, both alone and in social situations. The development of new naturalistic risk tasks, or new incentives for existing tasks, that use rewards and punishments that are more salient for this population (while still remaining safe and ethical) may be necessary to see this decision making play out in the lab.

In regards to treatment and juvenile-justice interventions, again it is likely to be very important to understand what motivates these adolescents and then incorporate those rewards into treatment. This would allow interventions to better drive decision making in certain individuals. Adolescents with psychopathic traits tend to show more instrumental and proactive aggression. Engaging in these aggressive behaviors is intended to achieve a goal rather than being rewarding in and of itself, just as high-CU youth are unlikely to engage in risk-taking for its own sake. Interventions which lower the reinforcement of antisocial strategies, using rewards which are motivating to this population, are likely to be most effective. Designing tailored treatment for these individuals may help prevent a lifelong pattern of offending, improve public safety, and decrease costs associated with juvenile delinquency.

In addition, it may be important to limit opportunities for youth with CU traits to engage with risky peers. In our study, these adolescents tended to make less advantageous decisions in groups and they may have an especially difficult time considering punishments while with peers. A group format may not be the best context to ask these juveniles to make weighty decisions. Further investigation is needed on how youth with CU traits influence their peers and the groups they are in. Within social contexts, one risky decision is unlikely to occur in isolation, and a reciprocal interaction or amplification may occur. Therefore, beyond just looking at individual-level differences in risk-taking, this group dynamic should be investigated further in a more systematic way.

There is reason for optimism when it comes to making meaningful change with this difficult population. Evidence suggests youth with significant CU traits tend to

perceive less social support and closeness (Haas et al., 2017). Yet, adolescents who report high levels of peer support tend to be buffered from the association between peers and risk (Telzer et al., 2015). Interventions designed at increasing positive, prosocial relationships may help increase this population's resistance to risky peer groups. Treatments using social skills training, which is designed to lower reinforcement of antisocial strategies and reinforce prosocial skills, has generally not been effective with adolescents with CU traits (Kjøbli, Zachrisson, & Bjørnebekk, 2016). However, traditional social skills training has not tailored these reinforcements to the specific population. Adolescents with CU traits have shown benefit in treatment when interventions focus on increasing parental warmth and praise and when the adolescents are able to develop a close relationship with their treatment provider (Kjøbli et al., 2016, Mattos et al., 2016). This suggests that high-CU individuals are able to build positive relationships and that increasing the amount of positive emotions within interpersonal relationships may help decrease antisocial behavior (Sakai, Raymond, McWilliams, & Mikulich-Gilbertson, 2019).

In addition, not all aspects of CU traits should be seen as inherently antisocial. Psychopathic traits may actually represent an advantage in some situations of risk (especially in individual contexts), and this tendency to be rational or planful may be a benefit. In addition, not all forms of risk-taking are inherently antisocial. CU traits show a greater association with prosocial forms of risk-taking, such as recreational risks (e.g., taking a skydiving class) and social risks (e.g., disagreeing with an authority figure on an important issue or admitting your tastes are different than those of a friend), while other psychopathic features show a greater association with more "antisocial" risks (Satchell,

Bacon, Firth, & Corr, 2018). This highlights the need to work with, instead of against, what drives these youth in order to be effective at encouraging meaningful change in these adolescents' lives.

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APPENDIX A

Standardized Instructions

Standardized directions are read aloud to the participants. In addition, prior to the beginning of each task, a summary of the instructions is presented on the computer screen.

Individual Condition Introduction: “Today I will be asking you to complete several different tasks on the computer. These tasks are designed to look at how you make decisions. I will explain each task to you before we begin. There is no winning or losing on these tasks, but I am asking you to try your best. Some of the tasks may ask you to try and gather as many points or coins as you can, but keep in mind that you will not be given any actual money to play with, you cannot lose any real money, and there is no compensation for participating in today’s study. Do you have any questions?”

Group Condition Introduction: “Today I will be asking you all to complete several different tasks on the computer. There are three tasks, so each of you will complete one of them. These tasks are designed to look at how you make decisions. I will explain each task to you before we begin. There is no winning or losing on these tasks, but I am asking you to try your best. Some of the tasks may ask you to try and gather as many points or coins as you can, but keep in mind that you will not be given any actual money to play with, you cannot lose any real money, and there is no compensation for participating in today’s study. When you are completing your task, you will sit at the computer and be in charge of making decisions. The other two people that are observing are allowed to make comments, but ultimately it is up to the person completing the task to make the decisions in the game. It is not a group decision. When you are observing, please I ask that you are

not distracting or demanding. If there is any issue with anyone communicating disrespectfully, we will have to end the task. Do you have any questions?"

BART Directions: "Now, you're going to see 30 balloons, one after another, on the screen. For each balloon, you can click the button that will pump up the balloon. Each time you click the pump button, the balloon pumps up a little more.

BUT remember, balloons pop if you pump them up too much. It is up to you to decide how much to pump up each balloon. Some of these balloons might pop after just one pump. Others might not pop until they fill the whole screen.

You get virtual money for every pump. Each pump earns $.05. But if the balloon pops you lose the money you earned on that balloon. To keep the money from a balloon, stop pumping before it pops and click the button labeled "Collect $$$."

After each time you collect money or pop a balloon, a new balloon will appear. At the end of the experiment, you will be paid the amount earned on the game. Click the button now to continue. Do you have any questions?"

ART Directions: "During this tournament you will play a fishing game for 30 rounds. Your goal is to earn as much money as possible during each round. On the screen you will see a pond. Click the "Go Fish" button to catch a fish. Each click of the "Go Fish" button will catch a fish.

Each time you catch a RED fish you will earn $0.05 in virtual money that will be placed in your temporary bank labeled Trip Bank on the screen. If you catch a BLUE fish you will lose the money you have earned on that round, and that fishing round will end.

If you want to keep the money from the round you must decide when to stop attempting to catch a red fish, and decide to collect the money you have earned. Clicking

the button labeled COLLECT will end the round, place the money you earned in your permanent bank account labeled Tourney bank, and begin your next round.

You cannot see how many fish of each color are in the pond. Each time you catch a fish, the computer will take the fish you caught from the pond and place it into the cooler on the right side of the screen. Consequently, the chance of catching a blue fish increases each time you catch a red fish. Do you have any questions?"

IGT Directions: "In this experiment, you will be asked to repeatedly select a card from one of the four decks above. You can select a card by clicking on it with your mouse.

With each card, you can win some money, but you can also lose some. Some decks will be more profitable than others. Try to choose cards from most profitable desks so that your total winnings will be as high as possible.

You will get 100 chances to select a card from the deck that you think will give you the highest winnings. Your total earnings and the number of cards selected will be displayed on the screen. You will start with $2000. Click "Start" to begin. Do you have any questions?"

APPENDIX B

Demographics Questionnaire

Please write or circle the most appropriate answer.

1. How old are you? _____ years

2. What grade are you in? _____ grade OR Not in school

3. What race do you identify with?

   a) Caucasian/White

   b) Black or African American

   c) American Indian or Alaskan Native

   d) Hispanic/Latino

   e) Asian/Pacific Islander

   f) From multiple races

   e) Some other race: _____

4. What is you first language? English OR Another language: _____

5. What is the highest level of education completed by your mother?

   a) Less than high school

   b) High school graduate or equivalent

   c) Some college or technical degree

   d) Bachelor's degree

   e) Graduate degree

   f) N/A or None of the above

6. What is the highest level of education completed by your father?

    a) Less than high school

    b) High school graduate or equivalent

    c) Some college or technical degree

    d) Bachelor's degree

    e) Graduate degree

    f) N/A or None of the above

7. How many times have you been arrested? _____

8. How many times have you been detained? _____

    a. What pod are you currently housed in at detention? _____

9. Have you ever been a member of a gang? Yes OR No

10. Are you currently a member of a gang? Yes OR No

11. Have you ever been in foster care or a group home? Yes OR No

VITA

Laurel A. Mattos, M.A.

Curriculum Vitae
Department of Psychology and Philosophy
Sam Houston State University

EDUCATION

August 2018 – Present — **Pre-Doctoral Psychology Internship, Forensic Concentration**
Patton State Hospital
Patton, California
Director: David Glassmire, Ph.D., ABPP

August 2013 – Present — **Doctor of Philosophy in Clinical Psychology (Forensic Emphasis)**
Sam Houston State University
Huntsville, Texas
Dissertation: The Effect of Callous-Unemotional Traits and Peer Influence on Risk-Taking in Delinquent Adolescents (Proposed: 03/2016)
Chair: Craig E. Henderson, Ph.D.

August 2015 — **Master of Arts in Clinical Psychology**
Sam Houston State University
Huntsville, Texas
Thesis: Therapeutic Alliance and Treatment Outcome: The Role of Callous-Unemotional Traits
Chair: Adam T. Schmidt, Ph.D.

May 2013 — **Bachelor of Arts in Psychology, with Honors**
Brown University
Providence, Rhode Island
Thesis: Pretend Disgust: Studying the Effect of Action Aversion on Self and Other Decision Making
Chair: Fiery Cushman, Ph.D.

TEACHING EXPERIENCE

September 2017 – May 2018 — **Teaching Assistant**
Assessment of Intelligence and Academic Achievement
Graduate Course
Department of Psychology and Philosophy
Sam Houston State University

Duties:
- Demonstrated intelligence and achievement test administration
- Conducted administration and scoring checks for various intelligence and achievement tests with students in clinical and school psychology graduate programs

Supervisor: Ramona Noland, Ph.D., NCSP, LSSP

September 2017 – May 2018 **Teaching Assistant**
Assessment of Personality and Psychopathology
Graduate Course
Department of Psychology and Philosophy
Sam Houston State University

Duties:
- Supervised graduate-level student clinicians learning to conduct clinical interviews and personality assessments
- Reviewed and provided feedback on written assignments including mock reports of personality assessment

Supervisor: Jaime Anderson, Ph.D.

June 2017 – August 2017 **Teaching Assistant and Peer Supervisor**
Introduction to Doctoral Practicum
Graduate Course
Department of Psychology and Philosophy
Sam Houston State University

Duties:
- Supervised first-year clinical psychology doctoral students performing mock therapy sessions
- Provided feedback and assisted with progress evaluations
- Reviewed and provided feedback on written assignments including mock mental status exams
- Co-led class discussions

Supervisor: Mary Alice Conroy, Ph.D., ABPP

January 2013 – May 2013 **Teaching Assistant**
Social Psychology
Undergraduate Course
Department of Cognitive, Linguistic and Psychological Sciences
Brown University

Duties:
- Facilitated weekly section reviewing course material
- Assisted in administration and grading of exams

Supervisor: Fiery Cushman, Ph.D.

RESEARCH EXPERIENCE

September 2016 – Present — **Principal Investigator (Dissertation Project)**
The Effect of Callous-Unemotional Traits and Peer Influence on Risk-Taking in Delinquent Adolescents

- Develop project exploring risk-taking behavior, personality traits, and peer influence in a population of justice-involved adolescents
- Obtain a sample of detained adolescents from a local juvenile probation department
- Select and train a research team of student clinicians to assist in data collection
- Coordinate and conduct data collection
- Enter and analyze data in SPSS and Mplus
- Present related research at American Psychology-Law Society annual conference

Chair: Craig E. Henderson, Ph.D.

September 2016 – May 2018 — **Co-Principal Investigator**
The Effects of Telepsychology on Interview Disclosure

- Developed project exploring the effects of telepsychology and therapeutic alliance on the quality and quantity of interview disclosures
- Selected and trained a research team of graduate students to assist in semi-structured interviews for data collection
- Interviewed undergraduate students regarding previous moral transgressions
- Co-authored research presented at American Psychology-Law Society annual conference

Supervisor: Jorge G. Varela, Ph.D.

August 2016 – June 2017 — **Data Collector for Peer's Dissertation**
Content and Quality of Forensic Examiners' Reports of Competence to Stand Trial

- Coded and analyzed competency evaluation reports in relation to state statutory guidelines

Supervisors: Jorge G. Varela, Ph.D.; Kelsey Laxton, M.A.

September 2014 – March 2015 — **Principal Investigator (Thesis Project)**
Conduct Problems and Therapeutic Alliance: The Role of Callous-Unemotional Traits

- Designed and carried out an original project examining therapeutic alliance and treatment outcome in a sample of urban adolescents through secondary data analysis
- Analyzed data in SPSS
- Presented related research at several conferences
- Published results in a peer-reviewed journal

Chair: Adam T. Schmidt, Ph.D.

August 2014 – May 2016 **Graduate Research Assistant**
Pathways to Resistance: Understanding Mental Health and Protective Factors in Children of Incarcerated Parents

- Assisted in conceptualization and design of project
- Trained researchers in clinical measures
- Collected clinical measures with parent and adolescent participants
- Attended and presented research at regular lab meetings
- Led undergraduate research discussions

Supervisor: Adam T. Schmidt, Ph.D.

August 2013 – July 2014 **Graduate Research Assistant**
Personality and Legal Psychology Lab
Sam Houston State University

- Conducted literature review
- Outlined and summarized relevant literature to assist with publications

Supervisor: Rob J. Cramer, Ph.D.

September 2011 – May 2013 **Undergraduate Research Assistant**
Moral Psychology Research Lab
Brown University

- Collected and analyzed psychophysiological data (including electrocardiogram, impedance cardiography, galvanic skin response, and startle blink)
- Entered and coded data
- Designed and carried out an independent honors thesis examining the role of disgust in moral decision making in undergraduate students

Supervisor: Fiery Cushman, Ph.D.

PUBLICATIONS

Mattos, L. A., Schmidt, A. T., Henderson, C. E., & Hogue, A. (2017). Therapeutic alliance and treatment outcome: The role of callous-unemotional traits. *Psychotherapy, 54,* 136-147. doi:10.1037/pst0000093

CONFERENCE PRESENTATIONS

Mattos, L. A., Henderson, C., Marshall, K. K., Christensen, M. R., & Ryan, L. J. (2019, March). *Risky by association? The effect of CU traits and peers on risk-taking in delinquent youth.* Paper accepted to the annual meeting of the American Psychology-Law Society, Portland, OR.

Bryson, C. N., Boccaccini, M. T., Gowensmith, W. N., Laxton, K. L., **Mattos, L. A.**, Reinhard, E., Holdren, S., & Lawrence, J. (2018, March). *Time matters in competency to stand trial evaluations.* Poster presented at the annual meeting of the American Psychology-Law Society, Memphis, TN.

Laxton, K. L., Varela, J. G., Bryson, C. N., **Mattos, L. A.**, Reinhard, E. E., Holdren, S. M., Lawrence, J., & Minor, B. R. (2018, March). *Content and quality of forensic reports of competency to stand trial evaluations.* Paper to be presented at the annual conference of the American Psychology-Law Society, Memphis, TN.

Mattos, L. A., Bernhard, P., Varela, J., Yenne, E., Kavish, N., Long, T., Holdren, S., & Manyose, M. (2017, March). *The effects of telepsychology on interview disclosure.* Poster presented at the annual meeting of the American Psychology-Law Society, Seattle, WA.

Mattos, L. A., Schmidt, A., Henderson, C., & Hogue, A. (2016, March). *Therapeutic alliance and treatment outcome: The role of callous-unemotional traits.* Paper presented at the annual meeting of the American Psychology-Law Society, Atlanta, GA.

Mattos, L. A., Schmidt, A., Henderson, C., & Hogue, A. (2015, March). *Callous-unemotional traits predict therapeutic alliance in outpatient treatment of adolescents with externalizing disorders.* Poster presented at the annual meeting of the American Psychology-Law Society, San Diego, CA.

Mattos, L. A., Schmidt, A., Henderson, C., & Hogue, A. (2015, February). *Callous-unemotional traits predict therapeutic alliance in adolescents with externalizing disorders.* Paper presented at the annual Graduate Research Exchange, Huntsville, TX.

GRANTS AND SCHOLARSHIPS

2016	American Academy of Forensic Psychology Dissertation Grant
2015 – 2016	Leadership Scholarship Initiative (Sam Houston State University)

PROFESSIONAL AFFILIATIONS

American Psychological Association (APA)
American Psychology-Law Society (APA Division 41)